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A STUDY OF TEACHER OPINION REGARDING SOME OF THE
MEANS BY WHICH ELEMENTARY SCHOOL SCIENCE INSTRUCTION
CAN BE MADE MORE EFFECTIVE

DAVID E.. CZEKANSKI

SUBMITTED IN PARTIAL FULFILLMENT OF
REQUIREMENTS LEADING TO THE DEGREE OF
MASTER OF SCIENCE IN EDUCATION

STATE UNIVERSITY COLLEGE OF EDUCATION
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APPROVED:


Faculty advisor



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CHAPTER I

PRESENTATION OF THE PROBLEM

Purpose

The purpose of this study is to make a survey and an analysis of teacher opinion regarding the means by which science instruction in the elementary school can be made more effective, as judged by a group of elementary school teachers of East Irondequoit Central School District #1.

Statement of the Problem

The problem is defined as follows:

1. Developing a method of polling the opinion of elementary school teachers concerning those experiences which are considered most helpful in improving their programs of science instruction in grades kindergarten through six.
2. Developing methods of compiling and treating data for the purpose of reporting findings.
3. Selecting and reporting the relative importance of the methods and techniques considered to be most effective in improving science instruction in elementary schools as judged by groups of elementary school teachers.

Significance of the Problem

The significance of this problem is best stated by some authoritative writings in the fields of program and curriculum. Saylor and Alexander¹ feel that the greatest

1.. J. Saylor and W. Alexander, Curriculum Planning, pp.12-15.

concern must be to make improvements in curriculum wherever possible, that good curriculum promotes continuity of experience, and that a good curriculum uses effective learning experiences and needed resources.

The New York State Education Department¹ states that a well rounded program makes learning more meaningful to the pupil and provides for growth in the understanding of scientific facts that are a part of the children's environment.

Blough and Huggett² are of the opinion that evolutionary changes in our curriculum and alterations in our science program are inevitable. They also present evidence to support the feelings that the science program is an integral part of the total elementary program, and that programs help to ensure a sequence of subject matter from grade to grade.

Programs of science instruction can be only as good as the elementary school teacher makes them. Every effort should be made to help these teachers do the most effective job. What are some of the ways in which the teachers can be assisted to do a more effective job? Will a coordinator of science instruction help? Is a single text series part of the answer? Is an improved audio-visual program needed?

1. New York State Education Department, Science 7-8-9, p.9.

2. G. Blough and A. Huggett, Elementary School Science and How to Teach it, pp.8-9.

Can improvement of teacher education programs improve the total elementary science program? Some survey of methods and techniques considered most desirable as judged by elementary school teachers should be made. This study proposed to make this possible.

In short, there is a need for (1) an effective program and curriculum, and (2) continuing the never ending process of improving this program.

Procedure

The procedure for this study consisted of the following major steps:

1. Formulating a list of methods of improving science instruction in grades kindergarten through six.
2. Surveying the opinion of elementary school teachers regarding those methods and techniques considered most effective in helping teachers do a more effective job.
3. Developing a rating scale for validating the methods of improving instruction.
4. Determining the relative importance of the list of methods of improving science instruction, as judged by groups of elementary school teachers.
5. Analysis and interpretation of the findings.
6. Recommendations concerning methods and/or techniques for helping the elementary school teacher to do a more effective job of elementary school science education.

CHAPTER II

DEVELOPMENT OF A TECHNIQUE FOR DETERMINING RELATIVE IMPORTANCE

Rating Form

The rating form used here is very similar to one used and validated by Syrocki.¹ A copy of the rating form and the letter used in this survey are in the appendix.

Code Meaning and Values

VI Very important as a method of, or an aid to,
improving the elementary school
science program.

I Important as a method of, or an aid to,
improving the elementary school
science program.

O Of little or no importance.

NJ No Judgement do not feel qualified to, or do not
wish to pass judgement on this possible
method.

The four code letters were assigned the following
values for computation purposes.

VI - 4

I - 2

O - 0

NJ - No numerical value assigned. The "NJ" replies were
not used in computing the index of importance.

Index of Importance

The index of importance was determined by taking the sum

1. B. John Syrocki, "Considerations in Selecting, Developing and Validating Laboratory Experience Units in General Biology for Prospective Elementary School Teachers".

total of the judgement values and dividing it by the number of participating teachers. Teachers who used the "NJ" reply were not considered participants in that particular instance.

$$\text{Index of Importance} = \frac{\text{Sum total of judgement values}}{\text{Number of participating teachers}}$$

Estimating the Reliability of the Scale Values

In order to determine the consistency with which the polled teachers rated the methods of improving the elementary school science program, the Pearson's product-moment coefficient of reliability was computed by the split half technique. It was corrected for length by the Spearman Brown formula.

The returns of fifty-three teachers in East Irondequoit Central School District No. 1, and thirty-five teachers from outside this district were numbered as received. The odd numbered ballots were used for the "X" column and the even numbered ballots were used for the "Y" column in computing the correlation coefficient in both cases.

Reliability on the totals inside the district as determined by the split half method was $\sqrt{.94}$. The reliability on the totals for those outside the district was $\sqrt{.97}$. The reliability as computed on the totals for the ballots inside the district against the ballots from outside the district was $\sqrt{.86}$. The first two correlation coefficients mentioned here were corrected for length by the Spearman-Brown formula.

These correlation coefficients make the reliability of this rating scale quite evident. The elementary teachers

polled in this survey were very consistent in their opinions. There definitely was a high degree of agreement among the teachers regarding the possible methods of improving science in the elementary grades considered in the survey.

Additional Evidence of Reliability

Tables 1, 2 and 3 list the items in order of importance according to the computed index of importance.

Table 1

PLACEMENT, CODE VALUE, AND RELATIVE IMPORTANCE OF ITEMS CONSIDERED VERY IMPORTANT						
item No.	position		code in	value out	relative importance	
	in district	outside district			in	out
8	1	2	3.31	3.24	VI	VI
2	2	1	3.27	3.49	VI	VI
1	3	7	3.10	2.76	VI	VI
9	4	5	2.95	3.09	VI	VI
6	5	3	2.80	3.15	VI	VI
5	6	4	2.75	3.14	VI	VI
17	7	6	2.58	2.86	VI	VI

The seven items registering the highest code value herein are considered very important. These are listed above in Table 1. The next seven items are considered important and are listed in table 2. The last six items are considered of little or no importance and are listed in Table 3. It is feasible to draw these arbitrary lines which present more than two thirds of the items on the ballot as important. As has been noted, each of these items was considered at least important enough

Table 2

PLACEMENT, CODE VALUE, AND RELATIVE IMPORTANCE OF ITEMS CONSIDERED IMPORTANT						
Item No.	position in district	position outside district	code value		relative importance	
			in	out	in	out
10	8	8	2.49	2.65	I	I
13	9	20	2.48	1.31	I	O
3	10	10	2.29	2.55	I	I
12	11	9	2.25	2.65	I	I
19	12	13	2.25	2.29	I	I
15	13	19	2.00	1.41	I	O
20	14	11	1.83	2.46	I	I

Table 3

PLACEMENT, CODE VALUE, AND RELATIVE IMPORTANCE OF ITEMS CONSIDERED OF LITTLE OR NO IMPORTANCE						
Item No.	position in district	position outside district	code value		relative importance	
			in	out	in	out
11	15	12	1.72	2.30	O	I
16	16	16	1.64	2.00	O	O
14	17	17	1.63	1.94	O	O
7	18	15	1.60	2.06	O	O
4	19	18	1.40	1.45	O	O
18	20	14	1.39	2.46	O	I

for some of the authorities in the field of science programming to mention these items in their published material. For this reason the normal distribution was omitted and a general classification substituted.

Table 1 shows that the teachers within Irondequoit District #1 as well as teachers in surrounding districts rated the following methods of science improvement as very important. Numbers in parenthesis refer to item numbers in tables.

(8) A science program designed to provide children of grades kindergarten through six with a basic program of science that will enable them to pursue effectively science instruction in the seventh grade.

(2) A list of films, filmstrips, recordings, and other audiovisual materials available for instructional purposes in elementary science. This list is to be made according to science topics and designated for specific grade levels.

(1) A suggested guide to teaching science in the elementary school, other than the New York State Syllabus.

(9) A list of science books categorized according to topics and grade level, and made available to you upon request.

(6) Science courses offered for college credit to inform elementary school teachers of the newest developments in the fields of science as desired by the group.

(5) A file of science activities available to you for grades kindergarten through six.

(17) A bibliography of all science books in your school listed according to specific science topics and designated for use at specific grade levels.

There is some disagreement as to the exact order placement of

these items, but both have all of them listed in the very important first seven.

Table 2 shows a high degree of agreement regarding the relative placement of the next seven items or the items referred to as important.

(10) Science workshops in each school to help provide additional background in science content, and offered for inservice credit.

(13) Using one specific elementary science textbook series throughout all of the elementary schools in your district.

(3) A person in your school who is well trained in science and is allowed free time to teach science for you or help you teach a phase of science.

(12) A faculty library containing periodicals, magazines, pamphlets, and other reading materials pertaining to science education in the elementary school.

(19) A file of science units that have been tried and found to be most useful for instructional purposes by teachers within your district.

(15) District wide conferences on instructional methods, materials, and techniques in elementary science education.

(20) Conferences and discussions conducted by qualified personnel on the preparation of classroom materials for science teaching.

There was, however, a high degree of disagreement regarding

item thirteen. This possible method of improvement concerned the use of a single text series. Since the teachers in the district have not as yet adopted a planned science program, they may have felt that this was important to them in keeping continuity in the science teaching at least until such time as some elementary science program is outlined in detail. The areas outside the district have, in many cases, elementary school science programs of one type or another in effect and did not therefore see the need for one text series to work from. Since it was not stated in the letter to the teachers that there was no planned program in effect, most teachers probably thought in terms of their own situation and indicated their feelings accordingly. This is, of course, only a possibility, and looking objectively at item thirteen, it would have to be weighed with this factor of disagreement in mind. Item fifteen regarding conferences on science instruction, materials, and techniques would also have to be considered in the light of the disagreement shown in Table 2. The extent of agreement on the other items in the important category is high and certainly would have to be taken into account when considering the reliability of the placement of these items.

Concerning the six items rated "last" or of "little or no importance" in this survey, a small degree of disagreement is noted in item eleven, and to a somewhat greater degree in

item eighteen. Both these items concern a qualified person who is to teach science for the regular classroom teacher.

(11) An elementary school teacher with a good background in elementary science teaching who would be given free time to help other teachers in planning their science instruction.

(16) Meetings of teachers in individual schools to discuss problems pertaining to science instruction within their own schools.

(14) A person within your school district who could assist you in conducting your science field trips.

(7) An elementary school teacher provided with free time to help set up and assist in conducting science field trips.

(4) One or more teachers appointed to teach the science at a particular grade level.

(18) A person within the district, qualified in elementary science teaching, who could be called upon to teach a phase of science at the teacher's request.

There is strong agreement shown by both groups of teachers on these items.

Further evidence of reliability is presented in table 4. Every ten ballots were scored as received, and their relative indices of importance computed and charted. Only one notable exception was found to the general classification of the items after the first twenty ballots were in. This exception was item eleven which became progressively less important as

TABLE 4

RELATIVE IMPORTANCE AND PLACEMENT OF ITEMS AS DETERMINED AT TEN BALLOT INTERVALS										
Item No.	relative importance 1-10 place		relative importance 1-20 place		relative importance 1-30 place		relative importance 1-40 place		relative importance 1-53 place	
8	VI	3	VI	3	VI	2	VI	2	VI	1
2	VI	1	VI	1	VI	1	VI	1	VI	2
1	VI	1	VI	2	VI	3	VI	3	VI	3
9	I	10	VI	7	VI	5	VI	5	VI	4
6	VI	4	VI	4	VI	4	VI	4	VI	5
5	VI	6	VI	5	VI	6	VI	5	VI	6
17	VI	5	I	8	VI	7	I	8	VI	7
10	VI	6	I	9	I	8	VI	7	I	8
13	I	9	I	12	I	9	I	9	I	9
3	I	8	VI	6	I	11	I	10	I	10
12	I	14	I	12	I	10	I	11	I	11
19	0	15	I	14	I	14	I	13	I	12
15	I	10	I	11	I	12	I	12	I	13
20	0	15	0	16	0	15	0	16	I	14
11	I	12	I	10	I	13	I	14	0	15
16	I	13	0	17	0	16	0	15	0	16
14	0	18	0	15	0	17	0	18	0	17
7	0	15	0	17	0	18	0	17	0	18
4	0	19	0	19	0	20	0	20	0	19
18	0	20	0	19	0	19	0	19	0	20

the numbers of ballots received increased. Because the items do generally fall in the same general area consistently, it seems evident that little or no radical element colored the evidence. Teachers were in agreement on the basic issues.

CHAPTER III

ADDITIONAL METHODS OF IMPROVEMENT
SUGGESTED BY PARTICIPATING TEACHERS

The additional methods of improvement of science instruction as suggested by the participating teachers are listed in table 5, along with the frequency with which they were reported by teachers in East Irondequoit Central School District #1 and outside of this district.

Table 5

METHODS OF IMPROVEMENT
SUGGESTED BY PARTICIPATING TEACHERS

Method of improvement	Frequency	
	inside district	outside district
Have equipment and materials available for teacher use in conducting science classes.	9	6
A basic outline of material to be covered for each grade level to prevent overlap of material, promote continuity and/or intergrate the 1 - 12 science program.	4	3
The use of more than one text book at a grade level and/or having science reference materials in the room.	3	2
Science specialists to help teachers, but not to teach children.	2	2
Workshops or help in planning and exlcution of science trips.	2	1
Elementary school science lab.	0	2

The seven methods of improvement of science instruction

as listed in table 5 are a compilation of a number of suggested methods from various returns. The statements incorporate the meanings included in the teachers original return.

One of these suggested methods of improvement stands out above the others in frequency as well as importance. Without the proper equipment and materials the teacher cannot do as good a job teaching science as could be done with them. Much can be done with "make-shift" materials, but in many instances the necessary equipment is not attainable in this manner. By providing these necessary materials and equipment, science instruction in the grades could be improved.

CHAPTER IV

RELATED STUDIES

A search of recent periodicals provided one related study by Telfer.¹ This study concerned the development of a sound science program at the elementary and junior high level. A survey of several school systems was made investigating the following: "(1) Does your school system have a person supervising the science program? (2) If not, what do you believe such a person should be expected to do if one were hired?"² Coordinators of Elementary Education, Deputy Superintendents of schools, District Principals and school principals participated in this study. The Telfer study did not poll elementary school teachers.

The conclusions drawn in the Telfer study were as follows:

The coordinator should:

1. Work in close cooperation with entire administration and supervision staff. Understand the broad school problems and consider science a part of the whole.
2. Help orient new teachers to the system, especially those in his department. Be on hand to answer questions, explain policy and in general give a helping hand if needed.

1. Richard Telfer, "Developing a Sound Science Program for Elementary and Junior High Grades", "School Science and Mathematics", pp. 347-349.

2. Ibid. p. 348.

3. Work with all city science committee in developing and furthering the use of the resource guide. This should not be a directed type function, but rather helping, working with.

4. Provide opprotunities for visitation by teachers to classes of other teachers for portions of a day.

5. Act as a supply agent for science department by helping teachers with orders, selection of proper items, (especially in elementary area); getting a balanced division of equipment across the city.

6. Evaluate the audio-visual materials for science. Help select new materials, Work with teachers in preparing audio-visual needs, coordinate with audio-visual director.

7. Be available to do demonstration teaching where requested by a specific teacher who believes he or she might benefit from the experience.

8. Be available to discuss any problems that a principal might have with respect to science in his building whether it be about size of classes, teacher supervision or school supply.

9. Issue a bulletin for all teachers of science that would list new publications, free materials, new equipment, techniques being tried by others, and any other data that might be of value for helping teachers.

10. Keep up to date on new trends in education and guide the science program in the most up to date direction.

The preceeding duties are not all duties of the science coordinator, but rather a basic set from which others may be derived.¹

The Telfer study inferred that a coordinator of science was necessary for improving the science program. This study

1. Ibid. pp. 348-349.

recognized the need for:

- (a) helping the teacher to teach science
- (b) orientation of new teachers
- (c) providing adequate supplies and equipment for science instruction in order to promote maximum learning
- (d) keeping teachers informed of the most recent knowledge and developments in the field of science
- (e) providing science information for teacher use
- (f) recognizing the need for and knowledge of audio-visual materials and equipment in science.

CHAPTER V

FORMULATION OF A LIST OF METHODS AND SELECTION OF PARTICIPANTS

The methods used in this survey were derived from the development of science teaching methods in certain authoritative sources in the field of science teaching and curriculum or program planning. They were not taken wholly from any one source, but appeared in several different sources during various discussions of science education.

The abundance of text series throughout the area of science instruction is in itself an indication that a text series is important. This prompted the development of item thirteen, which is listed on page nine.

The much publicized need for the use of improved audio-visual materials lead to the formulation of items two, fifteen and twenty, as listed on pages eight and nine. These items and others herein were presented in different manners in an attempt to discern more specifically what the teachers considered as improvement in methods of science education and just where these changes should take place.

The prevalence of courses of study and planned programs in science in many schools and school districts shows a need for items one and eight in this survey, to see if the teachers really felt this was necessary as an area of improvement.

Coordinators of instruction are recognized as necessary for better teaching in many fields including science. In

order to ascertain the opinions of teachers concerning the need of a coordinator, items three, four and eleven, listed on pages nine and eleven, were directed toward a type of coordinator within each school. Items fourteen and eighteen, listed on page eleven, were directed toward the need of an overall coordinator for the central district. All five of these items concerned a coordinator who worked with the teacher, and/or close to the classroom. Items five, nine, seventeen and nineteen, listed on pages eight and nine, were aimed at a coordinator who would not be directly involved in the classroom, but who would set up or develop the areas of possible improvement as a part of his duties.

Teacher education has been advocated in many various ways as a method of improving science instruction. Items five, six, ten, sixteen, seventeen and nineteen, listed on pages eight, nine and eleven all pursue the teachers feelings in this area. These items attempt to discover how teachers can be best helped regarding their own education.

Availability of materials was discussed at times as a means of improvement in education. Items five, nine, seventeen, and nineteen also concern helping the teachers with regard to their own education.

Since opinions were being sought regarding many aspects of improved science instruction, the multi-purpose items were necessary to insure brevity as well as completeness.

Each item developed for use in this survey appear in various forms in several of the sources listed in the bibliography.

Each participant in this survey is an elementary teacher with an interest in improving the science curriculum. In an attempt to contact all interested elementary teachers in East Irondequoit Central School District #1, all of the elementary teachers were provided with ballots. In this way the interested teachers were able to reply, and those who did not wish to participate in the study, or who did not have the time to do so did not return the ballot.

Two methods were used in an attempt to contact teachers outside East Irondequoit Central District #1 who were interested in science in the elementary school. (1) Teachers enrolled in courses in elementary science methods were provided with ballots and were asked to reply, and (2) Other teachers, known to be interested in improving science curriculum were contacted and asked to participate in the study. The latter group of teachers are all employed in school districts in the central western area of New York state.

SUMMARY

Teachers want specific helps in the teaching of elementary science. Some of these helps are:

1. To follow a specific science program in each grade.
2. A film guide available for each grade level listed according to the topics presented in the designed science program for a specific grade level.
3. A guide to filmstrips for each grade level listed according to the topics presented in the science program.
4. A guide to recordings and any other audio-visual materials available for each grade level listed according to the science topics included in the science curriculum.
5. A bibliography of science books catagorized according to the topics presented in the program. The reading levels of the books is to be recommended.
6. A guide to teaching science in addition to the New York State Syllabus.
7. College credit science courses to be offered to inservice teachers to enable them to keep up to date with the latest developments in science.
8. A file of science activities catagorized according to topics and grade levels.
9. A list of all science books in the school library according to science topics and reading level.

Teachers want to make their own plans and teach the material themselves. They feel it would not be advisable to:

1. Have a science specialist to teach science in their room,
2. Have field trips planned or conducted by another person.

Teachers meetings, conferences and discussions regarding science are opposed by the majority of elementary teachers in this survey. They feel there is no real need for:

1. Meetings in individual schools to discuss problems which arise in science instruction,
2. Conferences on the preparation of classroom materials

The surveyed teachers felt that some methods of improvement were important, but not as important as those listed at the beginning of this summary. The methods of improvement considered important include:

1. Provision of workshops and conferences in science, preferably on the district-wide level, to include methods, materials, techniques and content.
2. Using one specific text series in the district.
3. A person in the district available to help with certain phases of science instruction.
4. Provision for a science library for the faculty of each school.
5. Providing a file of science units found to be especially effective at a particular grade level on various topics of science in grades K - 6.

CONCLUSIONS

The teachers are not necessarily contradicting themselves when they strongly oppose a person teaching for them and also state that a person to help them teach science is important. More likely, they are showing a strong opposition to another person teaching for them although recognizing the need for assistance in a specific area which they may find more difficult to put across. They therefore rule out a science specialist teaching all science in the elementary grades but still leave the door open to accept help in their own teaching where specific areas are concerned.

Certain specific improvements in the teaching of science in the elementary grades should be made. According to the teachers surveyed, some of these are:

1. A specific program designed to provide all children who enter the Junior High school with a basic science background.
2. Guides to films and filmstrips should be made available to each teacher. These should be listed according to grade level and science area.
3. Guides for all other available audio-visual materials, (recordings, tapes, radio program and television schedules), should be made available to all elementary teachers. These should also be listed according to grade level and topic or science area.

4. A guide to science education at a particular grade level should be developed for teachers to refer to during the year to help provide the children with a basic science background.
5. A list of all available science books, as well as all science books in the school library, should be made available for each teacher. These lists should be made according to grade level and science area.
6. Science courses should be arranged in order to have inservice teachers become more aware of the latest developments in the areas of science.
7. A file of science activities should be made available to all teachers to help them improve their teaching.

There are several items that were not considered as important to the improvement of science instruction as those already mentioned, but none the less were considered important. In attempting to improve science instruction in the elementary grades, one should examine and consider these possibilities:

1. Science workshops and conferences on instructional methods, materials and techniques in elementary science education offering inservice credit.
2. The use of one elementary science text book series in all schools of the district.
3. Provide a teacher with a good science background to

help the teachers in each school with certain phases of science at the request of the regular classroom teacher.

4. Provision of a faculty library of available science reading materials for each school.
5. A file of tried and highly successful science units made available to each elementary teacher.

In attempting to improve science instruction in the elementary grades, one should consider the elementary teacher's opposition to certain possible methods of improving instruction. Since elementary teachers consider certain specific items as having little or no importance in that improvement they would, unless confronted with evidence to change their opinion, strongly oppose:

1. Conferences and discussions or meetings of teachers in individual schools to discuss problems in science or in the preparation of classroom materials.
2. Outside assistance in planning science instruction.
3. Assistance in general in conducting or planning field trips.
4. A science specialist who would teach science in all the grades of a school for the individual teacher.
5. An outside science instructor in the district who would teach certain science units even at a teacher's request.

It appears that the elementary teachers realize the need for helps in the teaching of science and want to be helped to help themselves. They do not want anyone else teaching their science classes, but instead want more and better materials for teaching and want instruction that will keep them up-to-date with scientific advances as they affect the science instruction of the children in their own classes.

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APPENDIX B

Ridgewood School
2200 Ridge Road
Rochester 22, N. Y.

Dear Elementary School Teacher:

At the present time I am writing an original research paper at Brockport State Teachers College. My topic has been approved, and I am now in the process of effecting this study which deals with methods of improving the elementary school science program.

The reason for asking elementary school teachers to evaluate a list of possible methods of improving the elementary school science program is to determine which of these various suggested methods are most important in the judgment of elementary school teachers. Each participating teacher is asked to place an "X" over one of the letters found to the left of each numbered statement. These letters represent the following:

VI	<u>Very important</u>	as a method of, or an aid to, improving the elementary school science program.
I	<u>Important</u>	as a method of, or an aid to, improving the elementary school science program.
O		Of little or no importance.
NJ	<u>No judgment</u>	do not feel qualified to, or do not wish to, pass judgment on this possible method.

Space is provided for your additional suggestions for ways of improving the elementary school science program.

You are not asked to sign your evaluation. If you are interested in a summary report of this study, please mail the enclosed post card with your name and address on it. I shall see to it that you receive a copy as soon as the study is completed. For your convenience a stamped, self-addressed envelope is enclosed for the return of the questionnaire.

I am looking forward to your return.

Sincerely,



David E Czekanski

Evaluate each of the twenty statements in terms of their importance as a means of improving science instruction in the elementary school. Please put an "X" over the letter(s) to indicate your evaluation. Use the code meaning of the letters as explained in the letter.

- VI I O NJ 1. A suggested guide to teaching science in the elementary school, other than the New York State Syllabus.
- VI I O NJ 2. A list of films, filmstrips, recordings, and other audio-visual materials available for instructional purposes in elementary science. This list is to be made according to science topics and designated for specific grade levels.
- VI I O NJ 3. A person in your school who is well trained in science and is allowed free time to teach science for you, or to help you teach a phase of science.
- VI I O NJ 4. One or more teachers appointed to teach the science at a particular grade level.
- VI I O NJ 5. A file of science activities available to you for grades kindergarten through six.
- VI I O NJ 6. Science courses offered for college credit to inform elementary school teachers of the newest developments in the fields of science as desired by the group.
- VI I O NJ 7. An elementary school teacher provided with free time to help set up and assist in conducting science field trips.
- VI I O NJ 8. A science program designed to provide children of grades kindergarten through six with a basic program of science that will enable them to pursue effectively science instruction in the seventh grade.
- VI I O NJ 9. A list of science books categorized according to topics and grade level, and made available to you upon request.
- VI I O NJ 10. Science workshops in each school to help provide additional background in science content, and offered for inservice credit.
- VI I O NJ 11. An elementary school teacher with a good background in elementary science teaching who would be given free time to help other teachers in planning their science instruction.
- VI I O NJ 12. A faculty library containing periodicals, magazines, pamphlets, and other reading materials pertaining to science education in the elementary school.
- VI I O NJ 13. Using one specific elementary science textbook series throughout all of the elementary schools in your district.

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- VI I O NJ 14. A person within your school district who could assist you in conducting your science field trips.
- VI I O NJ 15. District wide conferences on instructional methods, materials, and techniques in elementary science education.
- VI I O NJ 16. Meetings of teachers in individual schools to discuss problems pertaining to science instruction within their own schools.
- VI I O NJ 17. A bibliography of all science books in your school listed according to specific science topics and designated for use at specific grade levels.
- VI I O NJ 18. A person within the district, qualified in elementary science teaching, who could be called upon to teach a phase of science at the teacher's request.
- VI I O NJ 19. A file of science units that have been tried and found to be most useful for instructional purposes by teachers within your district.
- VI I O NJ 20. Conferences and discussions conducted by qualified personnel on the preparation of classroom materials for science teaching.

Please write in the space below any additional methods of improving elementary school science programs. List those which in your estimation are considered most important.